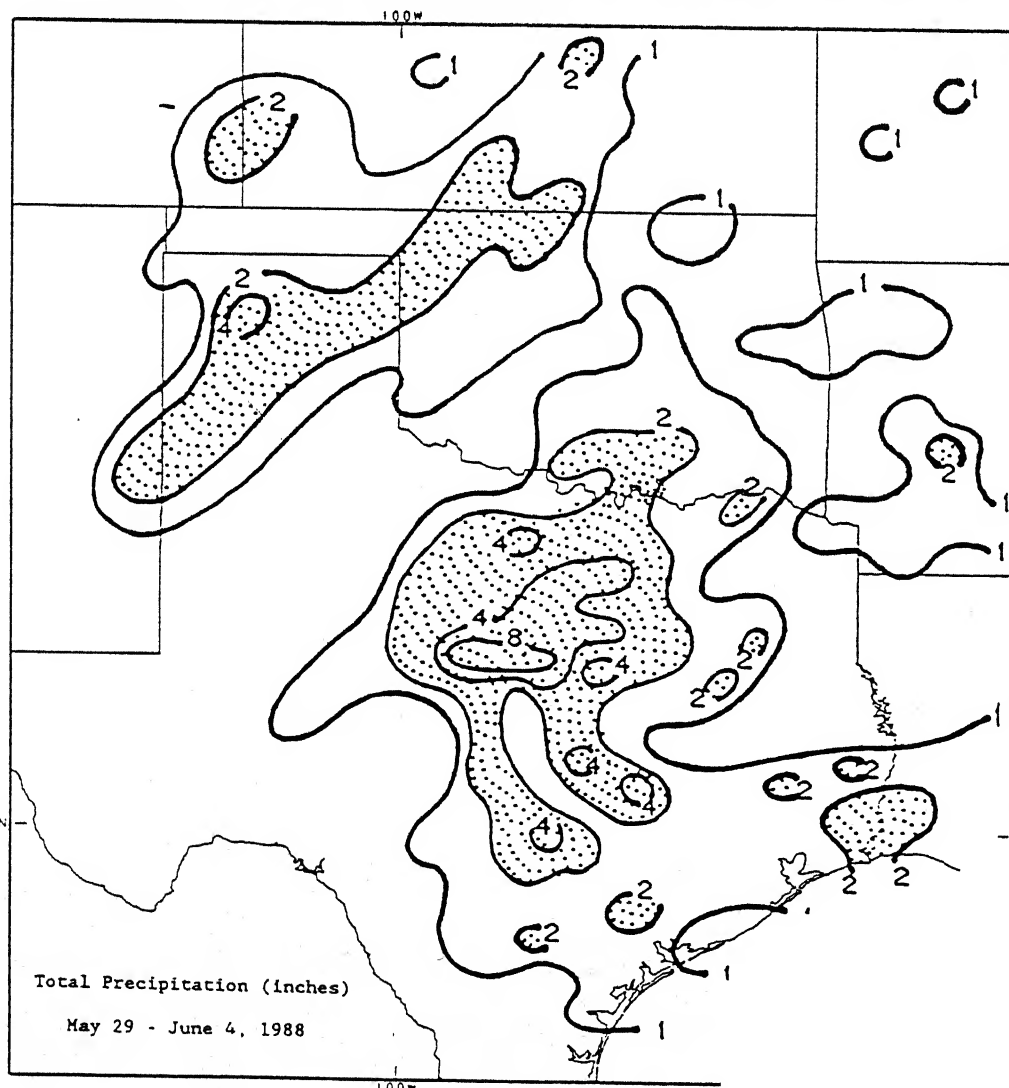


# WEEKLY CLIMATE BULLETIN

No. 88/23

Washington, DC

June 4, 1988



SEVERE THUNDERSTORMS DUMPED UP TO 14 INCHES OF RAIN IN NORTH-CENTRAL TEXAS AS SOME AREAS EXPERIENCED FLASH FLOODING; HOWEVER, THE HEAVY RAINS MISSED MOST OF THE ABNORMALLY DRY SECTIONS OF SOUTHERN AND EASTERN TEXAS AND STATES TO THE EAST AND NORTH. FOR FURTHER DETAILS OF THE ANOMALOUS CONDITION, SEE THE MAY REPORT.

## WEEKLY CLIMATE BULLETIN

Editor: David Miskus  
Associate Editor: Paul Sabol  
Contributors: Keith W. Johnson  
Vernon L. Patterson  
Graphics: Robert H. Churchill  
Robert P. Nester

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major global climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every 3 months).
- Global temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

To receive copies of the Bulletin or change mailing address, write to:

Climate Analysis Center, W/NMC53  
Attention: Weekly Climate Bulletin  
NOAA, National Weather Service  
Washington, DC 20233  
Phone: (301)-763-8071

# GLOBAL HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JUNE 4, 1988  
(Approximate duration of anomalies is in brackets.)

1. North Central U.S.A. and South Central Canada:  
WARM, DRY CONDITIONS PERSIST.

Little or no precipitation fell in the region, while unseasonably warm weather between 2°C (3.6°F) and 11.1°C (20.0°F) above normal further aggravated the unusually dry conditions [12 weeks-dry; 5 weeks-warm].

2. Central and Southern United States:  
DRYNESS CONTINUES IN MOST AREAS.

Rainfall amounted to 14.5 mm (0.57 inch) or less. Dryness persisted across much of the southern and central United States [9 weeks].

3. Eastern Europe:  
DRYNESS PREVAILS THROUGHOUT.

Light precipitation, generally under 9.8 mm (0.39 inch), was measured from Finland and Poland southward to northern Romania [9 weeks].

4. South America:  
COLD ACROSS EXTENSIVE AREA.

Temperatures were as much as 8.7°C (15.7°F) below normal across much of the continent east of the Andes from northern Bolivia to central Argentina [3 weeks].

5. Southeastern China:  
UNUSUAL WETNESS EASES.

Relief from unusually wet conditions came as precipitation totals were generally less than 79.3 mm (3.12 inches) and torrential rains ended [Ending at 4 weeks].

6. Afghanistan, Pakistan, and India:  
CONDITIONS REMAIN VERY HOT.

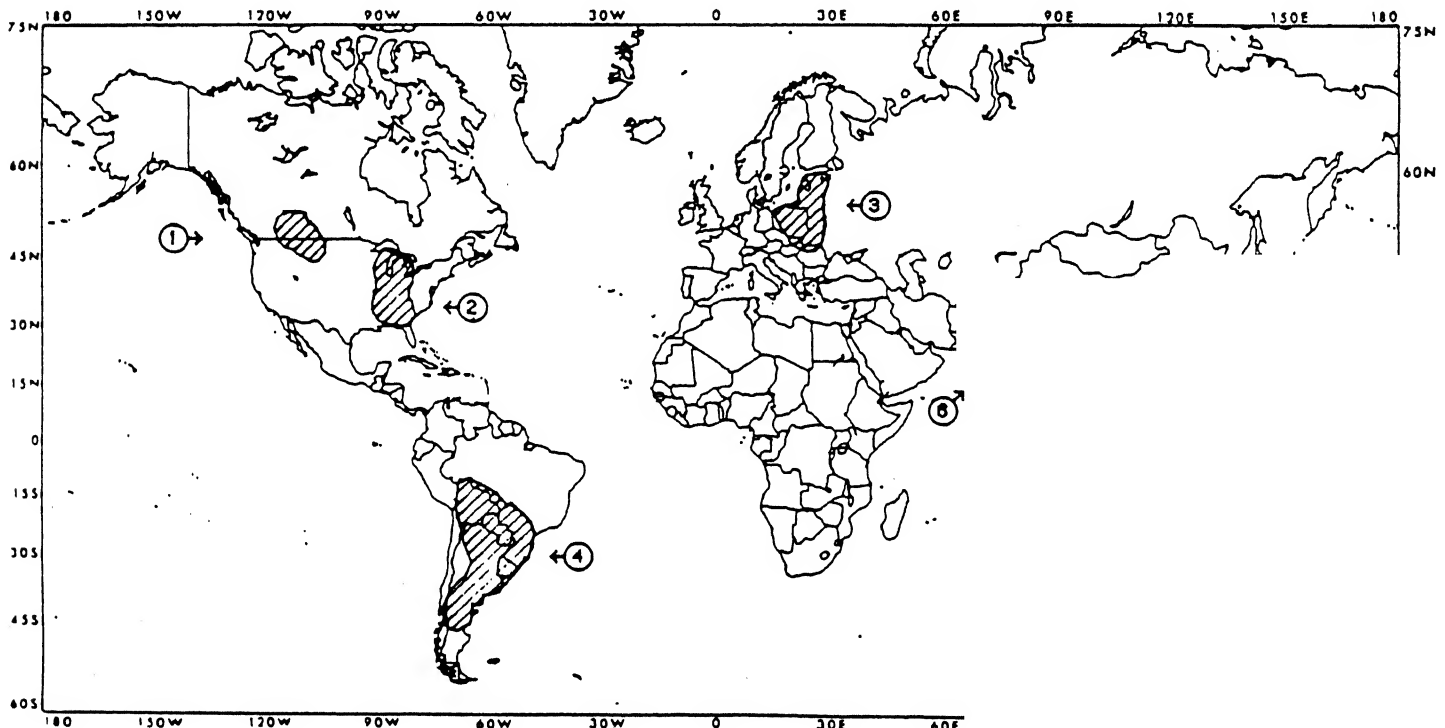
A severe heat wave continued across the region as some Indian stations reported temperatures as much as 4.6°C (8.3°F) above normal. Average daily maximum apparent temperatures for the week were as great as 47.4°C (117.3°F) [3 weeks].

7. Philippines and Taiwan:  
TORRENTIAL RAINS OCCUR.

Very heavy precipitation, up to 469.3 mm (18.48 inches) in the Philippines and 265.6 mm (10.46 inches) in Taiwan, resulted from the passage of Typhoon Susan through the area [Episodal Event].

8. Central Japan:  
UNUSUALLY HEAVY RAINFALL STRIKES AREA.

Many stations in central Japan reported heavy precipitation with up to 543.3 mm (13.95 inches) recorded [Episodal Event].



Approximate locations of the major anomalies and events described in this map. See the other world maps in this Bulletin for climatic anomalies, four-week precipitation anomalies, and (occasional) other events.

# U.S. WEEKLY WEATHER HIGHLIGHTS

FOR THE WEEK OF MAY 29 THROUGH JUNE 4, 1988

Strong thunderstorms dumped copious amounts of rain (up to 14.0 inches at Comanche, TX) which caused some localized flooding over much of northern and central Texas, while smaller totals (less than 4.0 inches) were measured in the panhandles of Texas and Oklahoma, south-central Kansas, southeastern Texas, and southwestern Louisiana, according to the River Forecast Center data (see front cover). In other sections of the country, moderate to heavy precipitation occurred along the coasts of northern California and the Pacific Northwest, in parts of the central and southern Great Plains, and in extreme southern Florida, where this year's first tropical depression in the Atlantic dropped up to 5.3 inches of rain on Homestead, FL (see Table 1). Light to moderate totals were observed from northern California northward into Washington, throughout most of the northern and central Rockies, in scattered locations of the northern Great Plains and upper Midwest, the eastern Great Lakes, and from coastal Georgia northward into Maine. Little or no rain fell in the Southwest and Great Basin states, in eastern Montana, the western Dakotas, and most of Wyoming, and from Iowa and southern Wisconsin southeastwards to the Florida panhandle due to a strong ridge of high pressure as both the Midwest and Southeast continued to be abnormally dry

this Spring (see Special Climate Summary-U.S. Monthly Review for further details).

Highs in the nineties and one hundreds prevailed across the northern Great Plains and upper Midwest as several stations established daily record maximum temperatures, especially during the latter half of the week. Largest weekly departures (+10 to +18°F) were common in eastern Montana, the Dakotas, Minnesota, and northern Wisconsin (see Table 2) as the heat further exacerbated the unusually dry conditions in the area. Elsewhere, slightly above normal temperatures were observed in parts of coastal California, the northern half of the Great Plains, southern Texas, the Midwest, Tennessee Valley, eastern Great Lakes, and central Florida. Cooler conditions dominated the country west of the Rockies, across the southern third of the U.S., and in most stations east of the Appalachians. Greatest departures below normal (between -6 to -10°F) were located in the Pacific Northwest and at scattered stations in the Southwest and southern Great Plains (see Table 3). Early and late in the week, some stations in the eastern half of the nation set record daily minimum temperatures as cold weather moved southeastwards out of Canada and into the region. Alaska and Hawaii experienced near normal weekly temperatures.

## WEEKLY WEATHER FEATURES WEEK ENDING JUNE 4, 1988

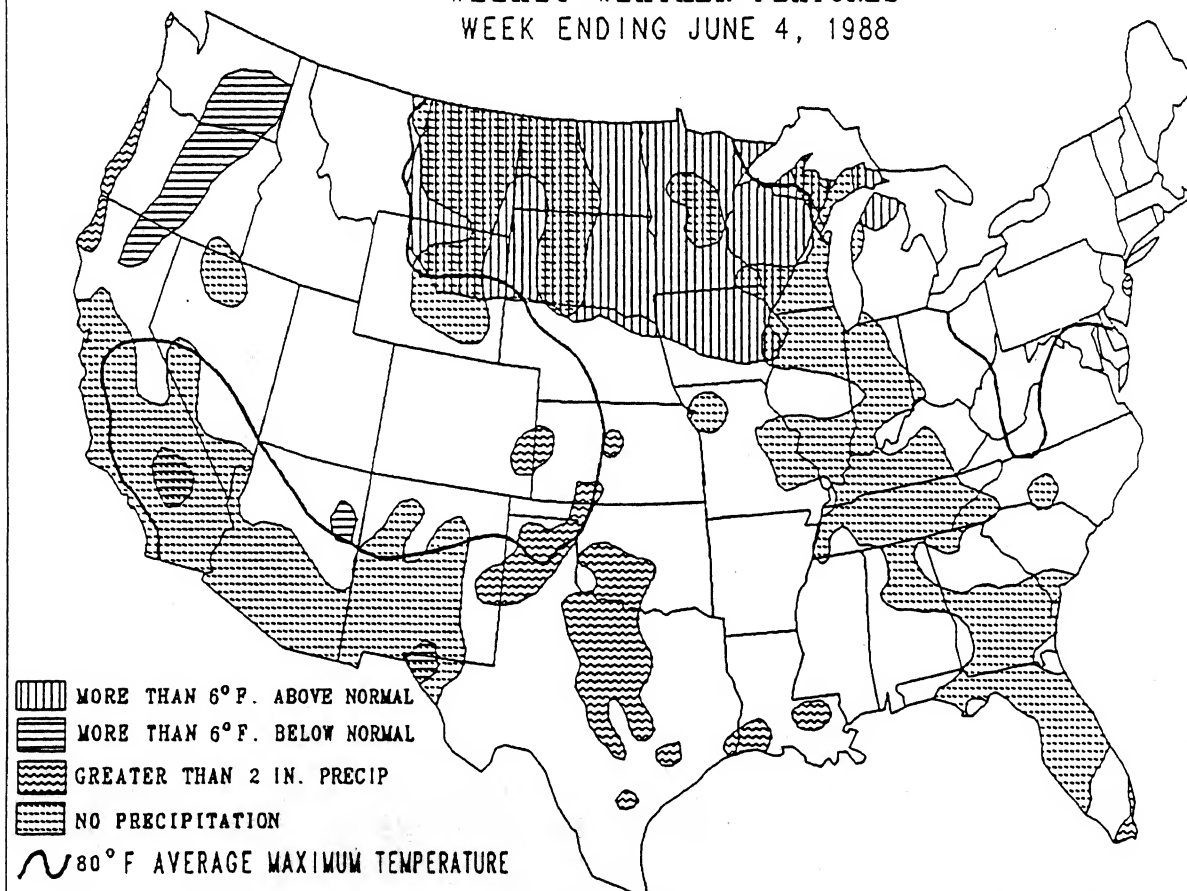


TABLE 1. Selected stations with more than two inches of precipitation for the week.

North Bend, OR	6.74	Lake Charles, LA	2.68
Homestead AFB, FL	5.34	Austin, TX (AUS)	2.68
Dallas NAS, TX (NBE)	4.33	Key West NAS, FL	2.60
West Palm Beach, FL	4.09	Killeen, TX	2.38
Beaumont, TX	3.91	Austin/Bergstrom AFB, TX (BSM)	2.35
Waco, TX	3.89	Miami, FL	2.22
Amarillo, TX	3.55	Dallas/Love, TX (DAL)	2.17
Dallas/Ft. Worth, TX (DFW)	3.54	Ft. Worth/Carswell AFB, TX	2.14
San Antonio, TX	3.52	Ketchikan, AK	2.09
Clovis, NM	3.28	Baton Rouge, LA	2.07
Abilene, TX	3.09	Salina, KS	2.06
Gage, OK	3.06	Quillayute, WA	2.03
Eureka, CA	2.77	Wrightstown/McGuire AFB, NJ	2.02

TABLE 2. Selected stations with temperatures averaging greater than 9°F ABOVE normal for the week.

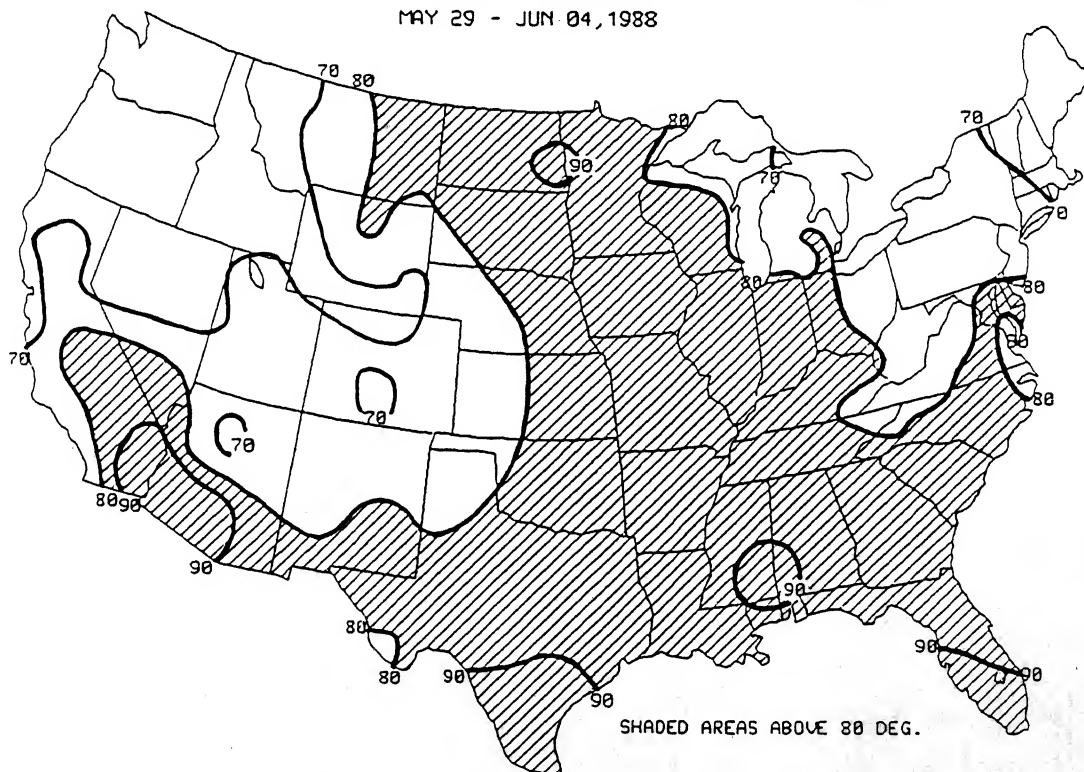
Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Grand Forks, ND	+18	78	Aberdeen, SD	+13	75
Jamestown, ND	+18	78	Watertown, SD	+12	74
International Falls, MN	+17	74	Minneapolis, MN	+12	76
Minot, ND	+17	76	Miles City, MT	+12	74
Devil's Lake, ND	+17	75	Spencer, IA	+11	76
Fargo, ND	+17	79	Sioux Falls, SD	+11	76
Warroad, MN	+16	74	Pierre, SD	+10	74
Alexandria, MN	+15	74	Gillette, WY	+10	68
Bismarck, ND	+15	75	Hancock, MI	+10	66
Williston, ND	+14	74	Duluth, MN	+10	65
St. Cloud, MN	+13	75	Huron, SD	+10	74
Glasgow, MT	+13	73	Park Falls, WI	+10	69
Dickinson, ND	+13	71			

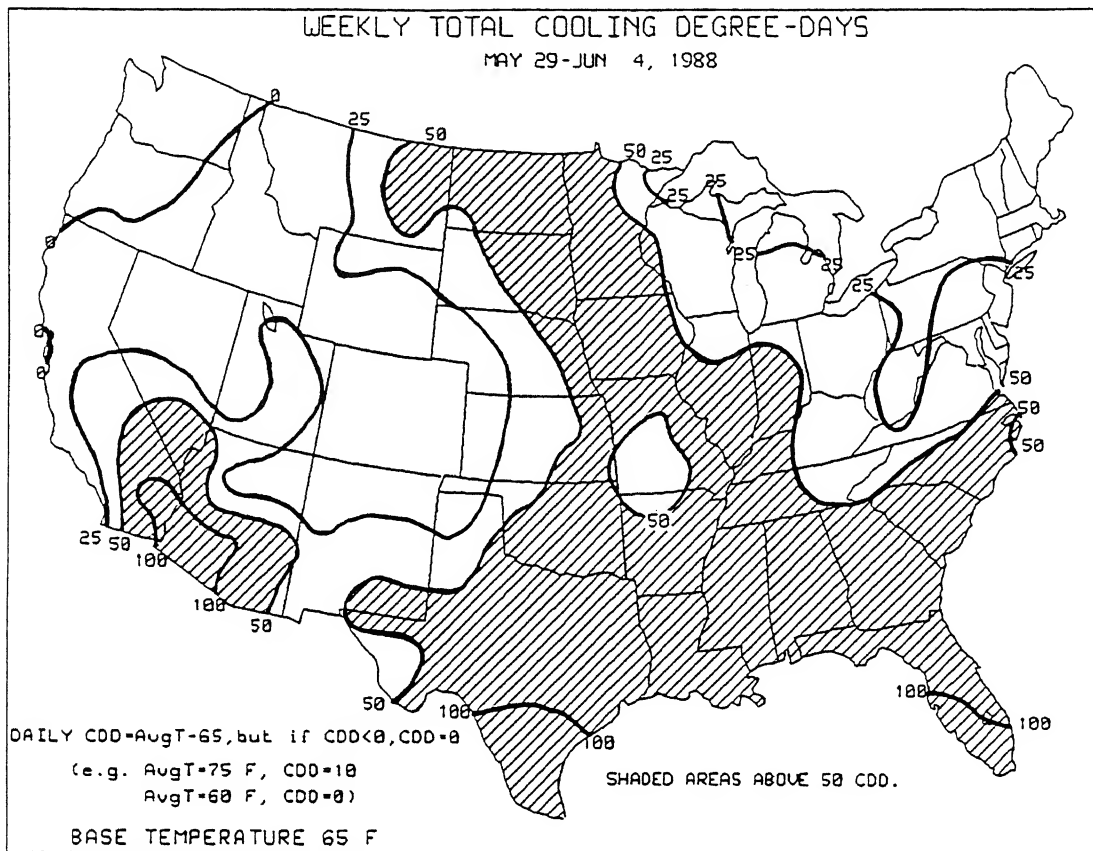
TABLE 3. Selected stations with temperatures averaging greater than 5°F BELOW normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Wenatchee, WA	-10	54	Yakima, WA	-7	54
Redding, CA	-9	64	Winslow, AZ	-6	62
Sexton Summit, OR	-9	44	Ukiah, CA	-6	59
Pendleton, OR	-8	55	Medford, OR	-6	56
Mt. Shasta, CA	-7	51	Dalhart, TX	-6	64
Redmond, OR	-7	48	Spokane, WA	-6	52
Bakersfield, CA	-7	68	Mt. Washington, NH	-6	35
Walla Walla, WA	-7	56	El Paso, TX	-6	72

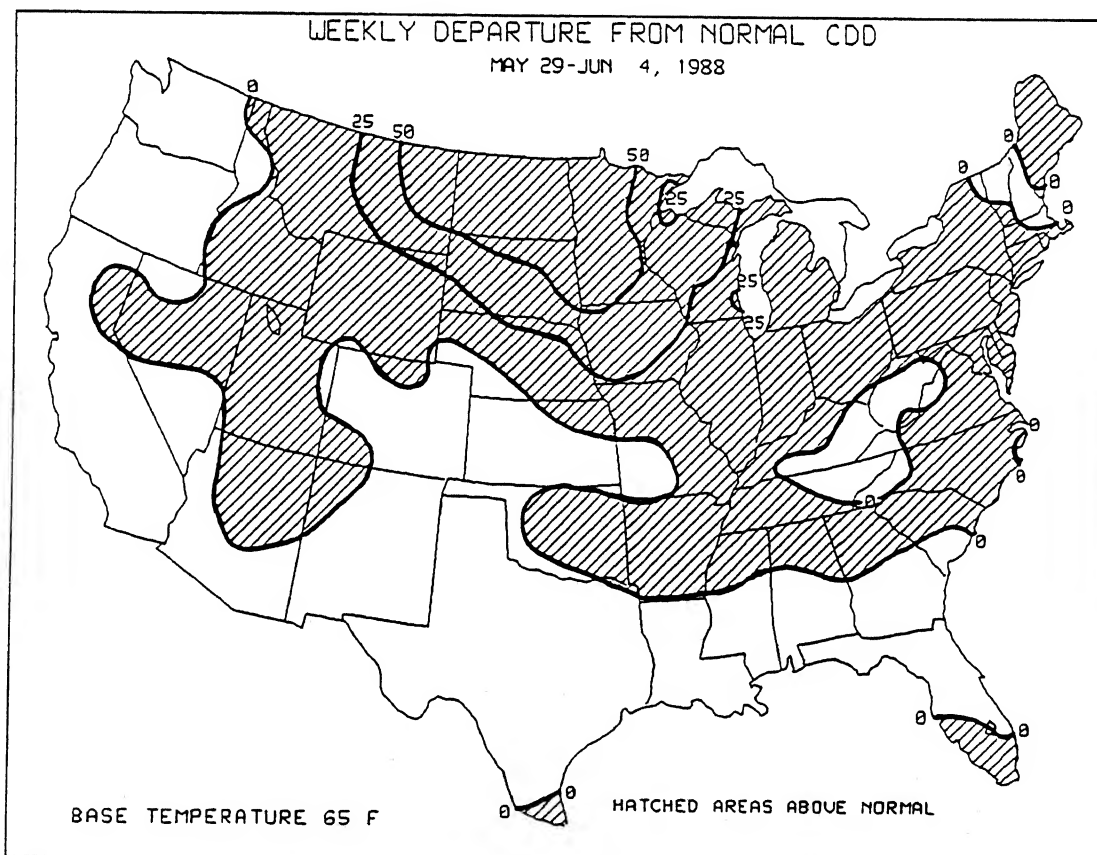
# AVERAGE DAILY MAXIMUM APPARENT TEMPERATURE (°F)

MAY 29 - JUN 04, 1988



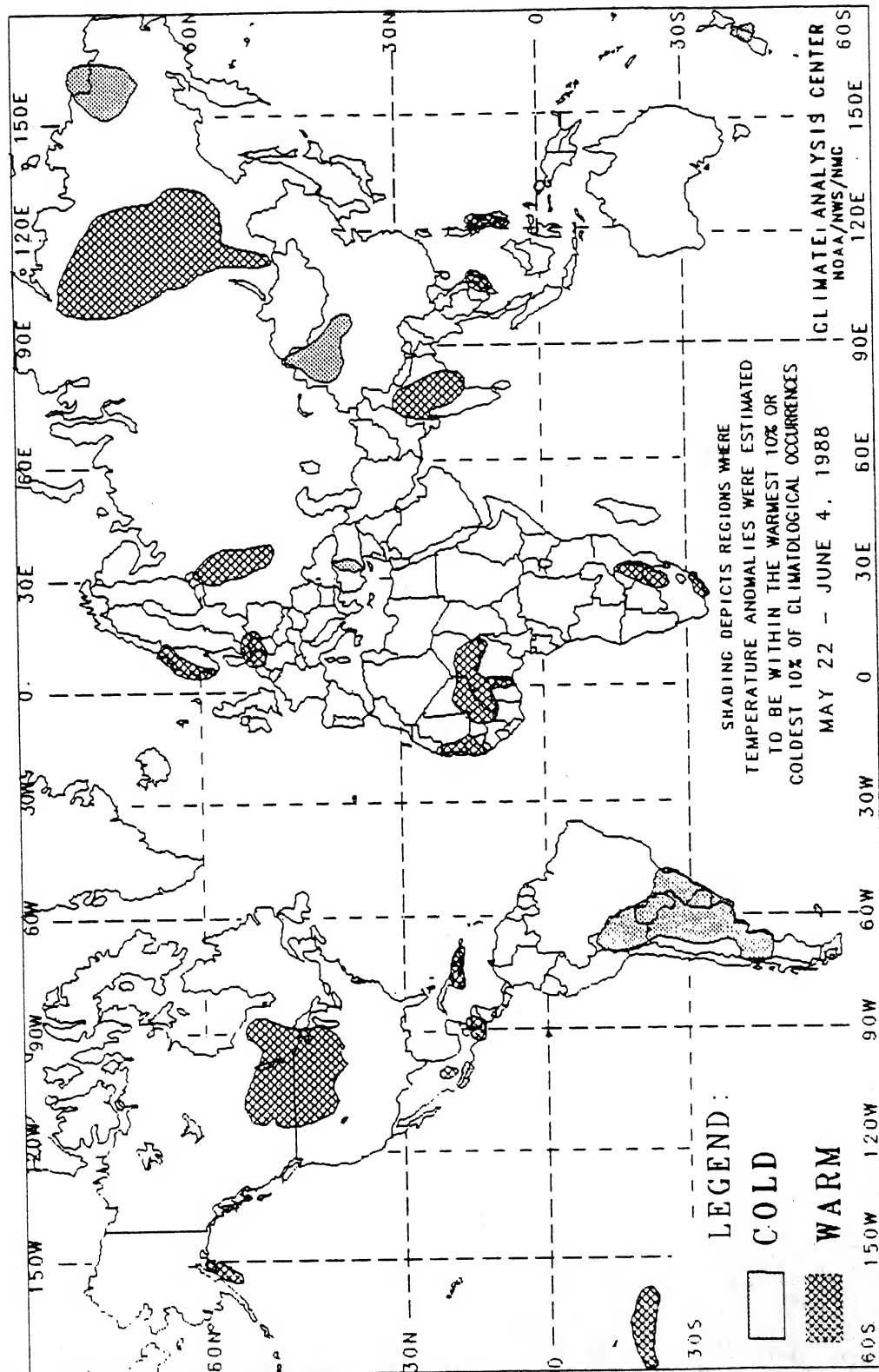


Unseasonably warm weather, most notably in the northern Great Plains and upper Midwest, increased the normal weekly demand for cooling degree days (base of 65°F) by more than 50 degrees, while below normal temperatures in the West and South slightly reduced the normal weekly CDD demand.



# GLOBAL TEMPERATURE ANOMALIES

2 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

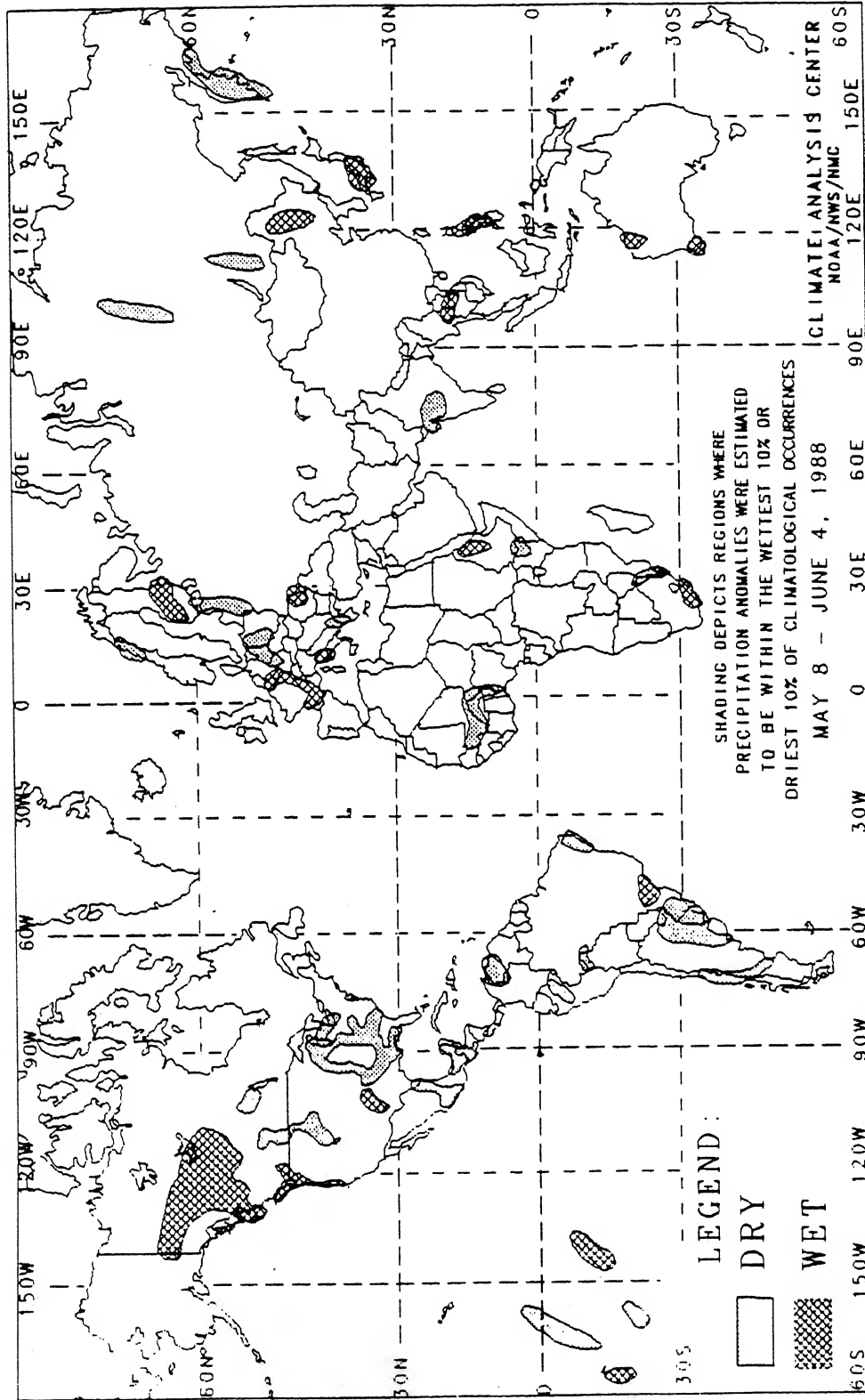
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in

# GLOBAL PRECIPITATION ANOMALIES

4 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

# SPECIAL CLIMATE SUMMARY

Climate Analysis Center, NMC  
National Weather Service, NOAA

## UNITED STATES CLIMATE SUMMARY FOR THE MONTH OF MAY 1988

May was characterized by record dryness across much of the Midwest and South, excessive precipitation in parts of the Pacific Northwest, Great Plains, and mid-Atlantic regions, abnormally warm weather throughout the north-central U.S., and below normal temperatures in most of the western and southern thirds of the nation.

Extremely dry conditions prevailed from Montana eastward to Michigan and southward to the Gulf Coast (see Table 1). Several stations in the Midwest and South either established or nearly set record minimum precipitation amounts for May (see Table 5). Areas with well under 40% of normal May precipitation included eastern Montana, Wisconsin, Iowa, Michigan, Illinois, Indiana, the eastern halves of Texas and Oklahoma, Arkansas, Louisiana, Mississippi, western Alabama, and the Florida panhandle (see Figures 1 and 2). A closer look at the region during May (see Figures 3-5) depicts several areas that measured under two inches of rainfall (Figure 3) and observed approximately 50% or less their normal precipitation (Figure 4). Since rainfall is normally greater in the southern sections in May, their deficits are likewise larger (between -3 to -5 inches) than the northern portions (between -2 to -3 inches) even though both areas reported similar percentages (see Figure 5). Furthermore, this marks the second consecutive month of below normal rainfall in the region (see Weekly Climate Bulletin dated 5/7/88). Driest portions in April were located in the Dakotas, Minnesota, and northern Wisconsin and from Iowa southeastward to northern Alabama. For the two month period, a large part of the region has experienced less than half their normal rainfall, with some stations reporting under 25% (see Figure 6). As a result, deficiencies of over 8 inches exist in northeastern Texas and northern Louisiana since April 1, while parts of Iowa and Illinois are 5-6 inches below normal (figure not shown). Elsewhere in the contiguous U.S., unusually dry

conditions were also found in most of the Southwest, Great Basin, Pacific Northwest interior, southern Rockies, northern Great Plains, the Southeast, the southern half of the Appalachians, and the western half of New England.

In contrast, unseasonably wet weather continued to affect coastal locations of northern California and the Pacific Northwest for the second straight month after a below normal rainy season (Dec., 1987-Mar., 1988). According to the River Forecast Center, maximum May amounts per state were 5.7, 11.3, and 15.5 inches in northwestern California, southeastern Washington, and northwestern Oregon, respectively. In addition, above normal precipitation fell throughout much of Alaska and the Hawaiian islands of Oahu and Kauai, in the northern Rockies, from southwestern Texas northward to South Dakota, and in the mid-Atlantic region, where torrential thunderstorms dumped up to 14.2 inches of rain last month in central Maryland (see Figure 7 and Table 2).

Unseasonably warm weather, more typical of early summer, dominated the northern Great Plains and upper Midwest last month and further aggravated the region's unusually dry conditions. Departures greater than +6°F were prevalent in eastern Montana, the Dakotas, Minnesota, Iowa, northern Wisconsin, and upper Michigan (see Table 3). A strong, persistent ridge of high pressure centered over the upper Midwest throughout most of the month was responsible for the warm weather as several stations established record May extreme maximum temperatures (see Table 7). Only a few locations set their highest May average temperatures (see Table 6), but several stations in the northern Great Plains and upper Midwest came very close to breaking their highest average monthly temperatures. Other areas that experienced abnormally warm conditions were parts of the Southwest, especially Arizona, stations along the West Coast, southern Texas, the northern

Rockies, New England, and much of Alaska and Hawaii (see Figures 8 and 9). Overall, this was the sixth warmest May over the last 58 years (starting in 1931) for the west-north central U.S. region (ND, SD, MN, IA, NE, KS, MO).

While the northern and central parts of the country were unusually warm, much of the mid-Atlantic, Southeast, southern Great Plains, California, and interior Pacific Northwest observed below normal temperatures. Greatest departures below normal (between  $-2$  to  $-4^{\circ}\text{F}$ ) were concentrated in northern Florida, southern Georgia, along the Gulf Coast, and in southwestern Texas (see Table 4). A few stations in Florida recorded their lowest May average temperatures, while Key West and Bakersfield, CA established record May extreme minimum temperatures.

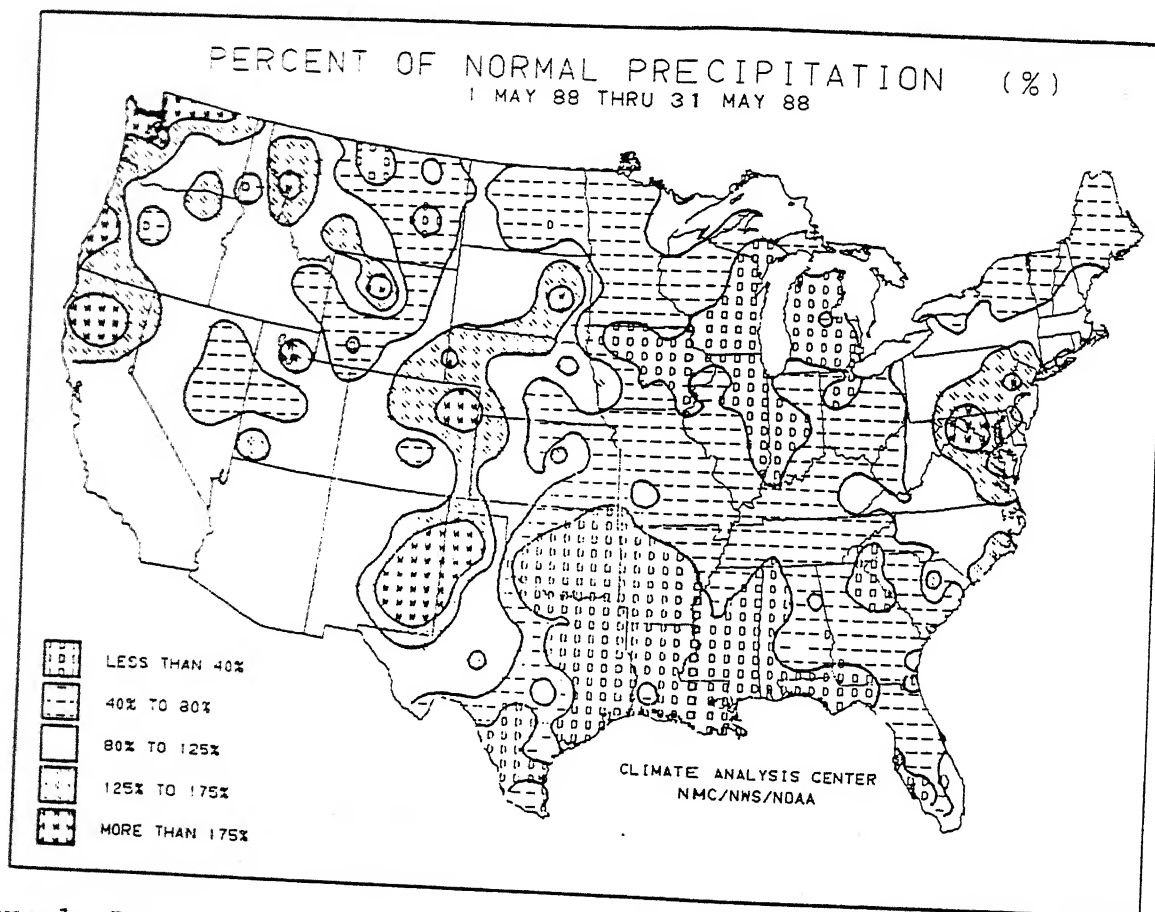


Figure 1. Percent of normal precipitation during May, 1988. Extremely dry conditions were reported in the Midwest and South, while parts of the Pacific Northwest, Great Plains, and mid-Atlantic measured above normal amounts.

TABLE 1. MAY STATIONS WITH LESS THAN 50% OF NORMAL PRECIPITATION AND MORE THAN THREE INCHES OF NORMAL PRECIPITATION.

Station	Total (in.)	% of Nml	Total (in.)	% of Nml
Longview, TX	0.02	0.4	4.95	31.0
Green Bay, WI	0.06	1.9	3.11	27.6
Pensacola, FL	0.08	2.1	3.87	4.78
Lufkin, TX	0.24	5.6	4.31	30.4
Montee, LA	0.29	5.8	5.04	4.37
Jackson, MS	0.30	6.1	4.91	40.5
Ft. Sill, OK	0.36	6.7	5.37	31.8
San Antonio, TX	0.41	11.2	3.65	4.22
Athens, GA	0.41	8.6	4.76	34.1
Shreveport, LA	0.42	8.9	4.71	3.96
Palacios, TX	0.48	10.2	4.71	30.6
Valparaiso, FL	0.49	12.3	4.00	4.68
Tallahassee, FL	0.51	9.9	5.14	36.5
Mobile, AL	0.58	10.7	5.44	40.9
Spencer, IA	0.59	16.1	3.67	3.52
Port Arthur, TX	0.61	12.3	4.94	46.7
Waco, TX	0.65	13.8	4.70	3.17
Ft. Myers, FL	0.68	16.5	4.11	34.9
Findlay, OH	0.79	22.3	3.55	4.33
Escanaba, MI	0.80	26.6	3.01	44.4
Galveston, TX	0.81	24.3	3.33	40.3
Selfridge AFB, MI	0.84	27.6	3.05	3.77
Tuscaloosa, AL	1.29	31.0	4.16	48.3
Houston, TX	1.32	27.6	4.78	3.19
Evansville, IN	1.33	30.4	4.37	5.18
Cleveland, OH	1.33	40.5	3.28	30.3
Jacksonville, FL	1.34	31.8	4.22	43.2
Marquette, MI	1.35	34.1	3.96	3.70
Joplin, MO	1.43	30.6	4.68	43.7
Des Moines, IA	1.44	36.5	3.94	3.68
St. Louis, MO	1.44	40.9	3.52	4.13
Bangor, ME	1.48	46.7	3.17	4.44
Muscle Shoals, AL	1.51	34.9	4.33	47.9
K.C., MO (MKC)	1.52	44.4	3.42	3.49
Wausau, WI	1.52	40.3	3.77	4.35
Sioux Falls, SD	1.54	48.3	3.19	3.85
England AFB, LA	1.59	30.7	5.18	4.00
Lafayette, LA	1.59	30.3	5.24	43.1
Augusta, GA	1.60	43.2	3.70	4.08
Dayton, OH	1.61	43.7	3.68	3.69
Waterloo, IA	1.61	39.0	4.13	4.51
Columbus, GA	1.62	36.5	4.44	4.54
Parkersburg, WV	1.67	47.9	3.49	43.1
College Station, TX	1.67	38.4	4.35	4.39
New Orleans, LA	1.68	33.3	5.05	47.6
Fayetteville, AR	1.68	30.8	5.46	4.01
Peoria, IL	1.69	43.9	3.85	49.4
Park Falls, WI	1.69	44.7	3.78	45.5
Atlanta, GA	1.69	42.3	4.00	4.24
Dallas/Love, TX	1.70	38.6	4.40	4.38
Grossville, TN	1.76	43.1	4.08	4.60
Grand Island, NE	1.77	48.0	3.69	42.1
Birmingham, AL	1.78	39.5	4.51	48.1
Nashville, TN	1.86	41.0	4.54	4.41
Charleston, SC	1.89	43.1	4.39	49.2
Wichita AFB, KS	1.91	47.6	4.01	42.5
Wichita, KS	1.91	49.4	3.87	5.50
Wichita, KS	1.93	45.5	4.24	4.92
Wichita, KS	1.94	44.3	4.38	4.33
Wichita, KS	1.99	43.3	4.60	4.41
Wichita, KS	2.04	42.1	4.84	4.33
Wichita, KS	2.12	48.1	4.41	4.92
Wichita, KS	2.13	49.2	4.33	5.04
Wichita, KS	2.34	42.5	5.50	46.4
Wichita, KS	2.35	47.8	4.92	
Wichita, KS	2.38	47.2	5.04	
Wichita, KS	2.43	46.4	5.24	

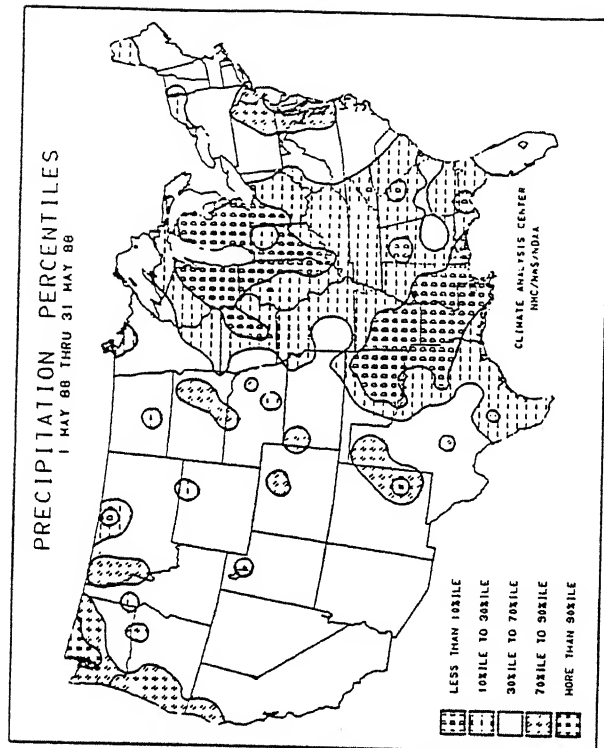


Figure 2. Precipitation percentiles for May, 1988. Some areas in the Midwest and South statistically and historically recorded their driest May.

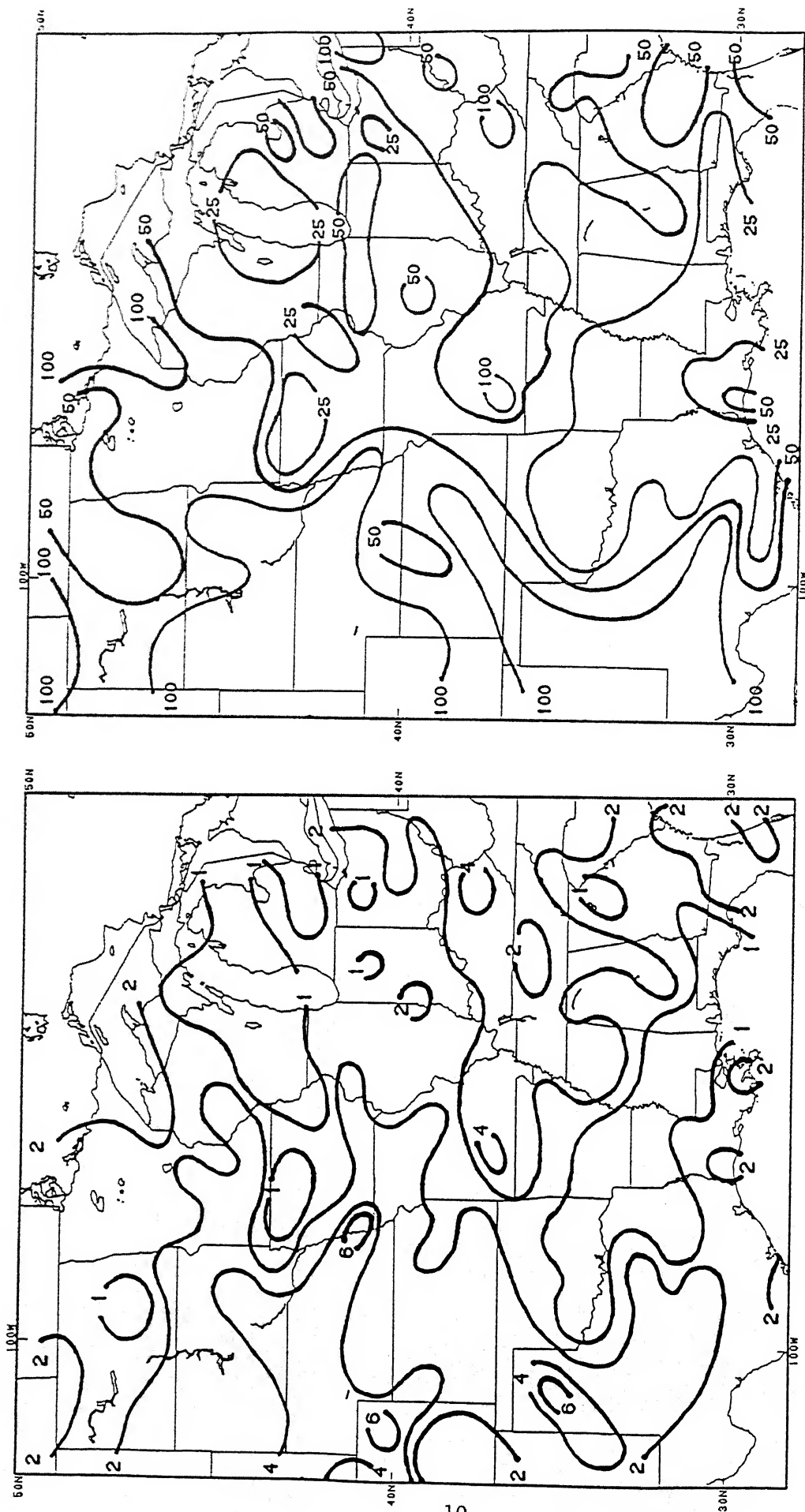
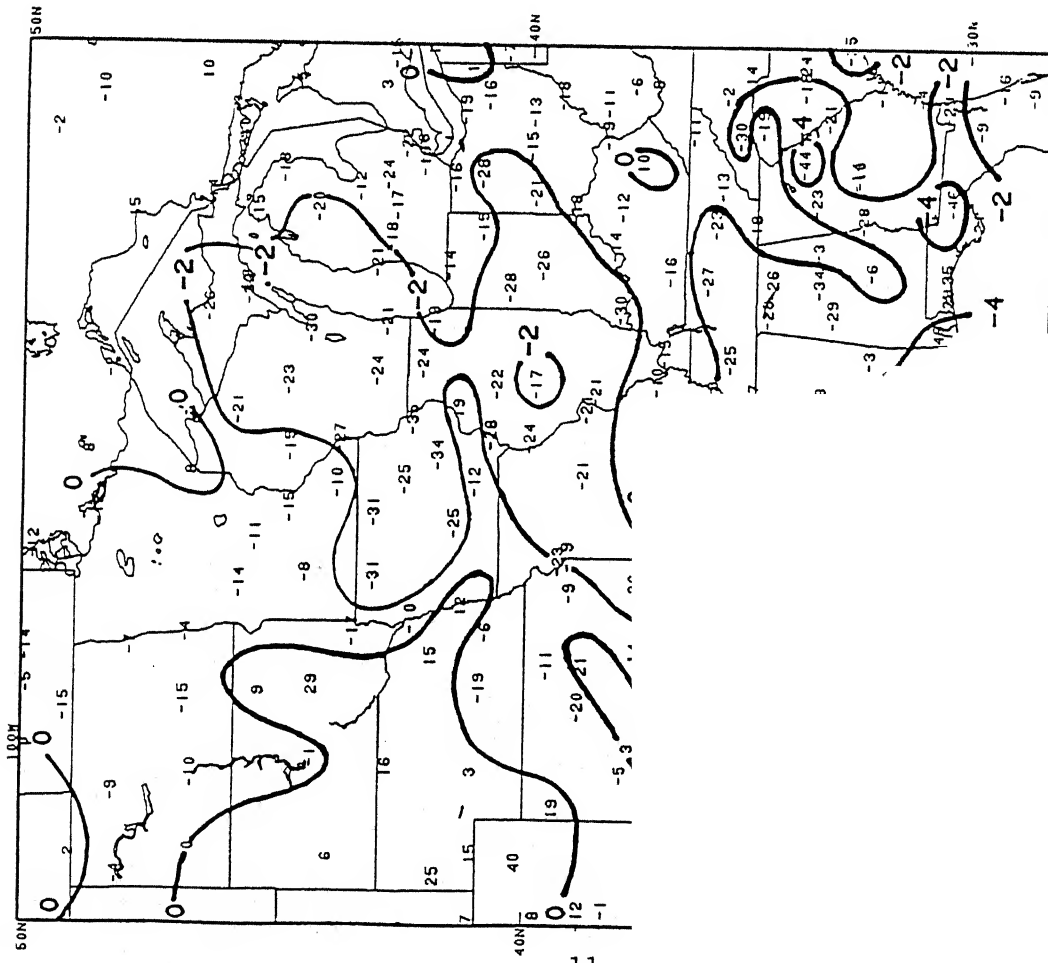


Figure 3. Total precipitation (in inches) for May 1-31, 1988. Many locations in the Midwest and South, which normally receive several inches of rain this month, observed under an inch of rain.

Figure 4. May 1988 percentage of normal precipitation. Many stations reported less than a quarter of their normal monthly total.



1 inches; station  
Largest deficits

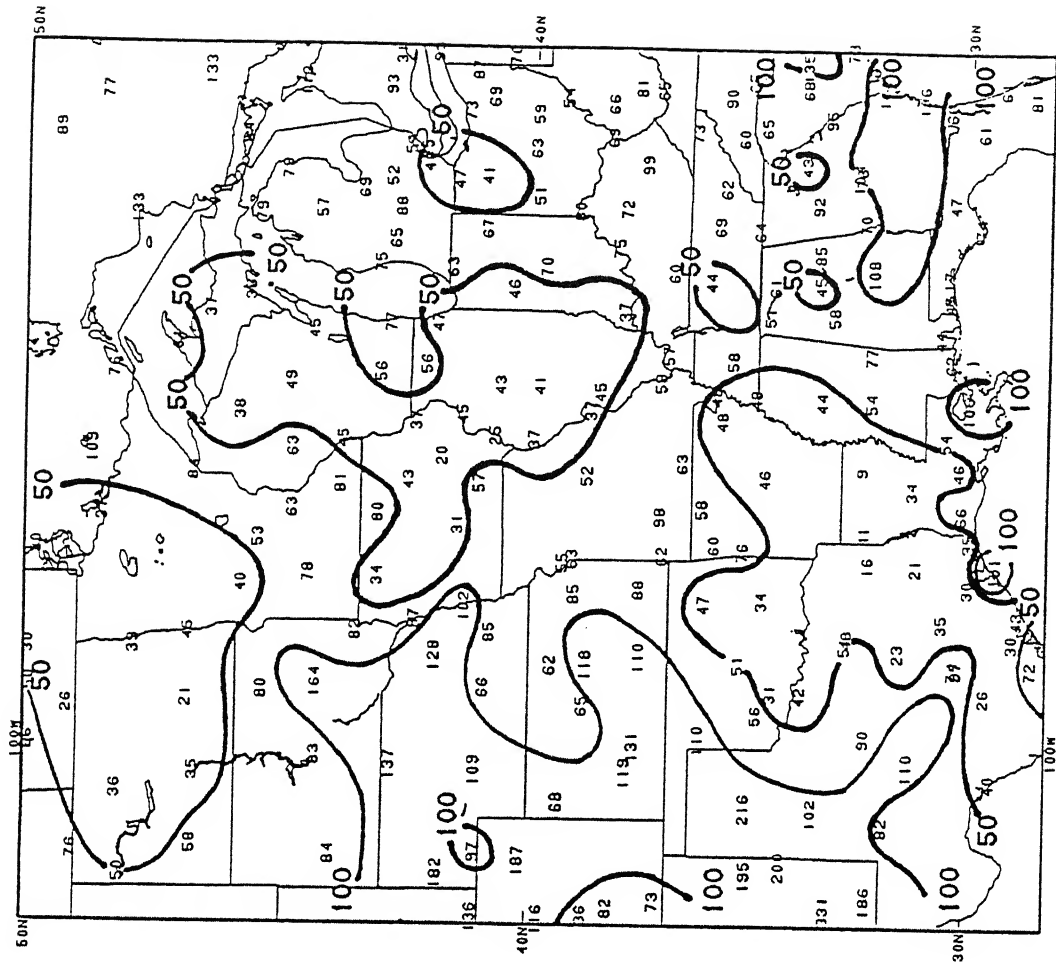


Figure 6. Percentage of normal precipitation during April 1-May 31, 1988.  
The two month percentages depict several regions with less than half their normal precipitation, namely the northern Great Plains, Midwest, and South.

TABLE 2. MAY STATIONS WITH MORE THAN 150% OF NORMAL PRECIPITATION AND MORE THAN THREE INCHES OF PRECIPITATION; OR, STATIONS WITH MORE THAN FIVE INCHES OF PRECIPITATION AND NO NORMALS.

Station	Total (in.)	Pct of Normal	Station	Total (in.)	Pct of Normal
Key West NAS, FL (NQX)	10.96	***	Sumter/Shaw AFB, SC	5.67	173.0
Quillayute, WA	10.68	205.7	Huron, SD	5.58	207.2
Washington/Dulles, VA	10.29	280.7	Cannon AFB, NM	5.25	252.7
Homestead AFB, FL	9.87	***	Scottsbluff, NE	5.19	195.0
Martinsburg, WV	9.67	270.1	Oceana NAS, NC	5.17	***
Key West, FL (EYW)	8.12	246.4	Pickstown, SD	4.91	167.9
North Bend, OR	8.04	301.9	Goodland, KS	4.82	166.3
Wilmington, NC	7.54	178.6	Valentine, NE	4.54	154.1
Allentown, PA	7.43	209.4	Bellingham, WA	4.27	212.1
Newport News, VA	7.41	***	Denver, CO	4.26	174.0
Jacksonville/New Rl, FL	7.26	***	Eugene, OR	3.71	190.3
Willow Grove NAS, PA	7.18	***	Roswell, NM	3.42	482.8
Akron, CO	7.11	230.8	Olympia, WA	3.28	175.9
Cherry Point, NC	6.96	***	Missoula, MT	3.12	194.6
Omaha/Offutt AFB, NE	6.31	***	McGrath, AK	3.06	407.3
Kokee, Kauai, HI	6.10	208.9	Redding, CA	3.03	236.9
Amarillo, TX	6.02	217.2	Seattle/Tacoma, WA	3.01	192.7
Newark, NJ	5.80	162.3			

(Note: Stations without normals are indicated by asterisks).

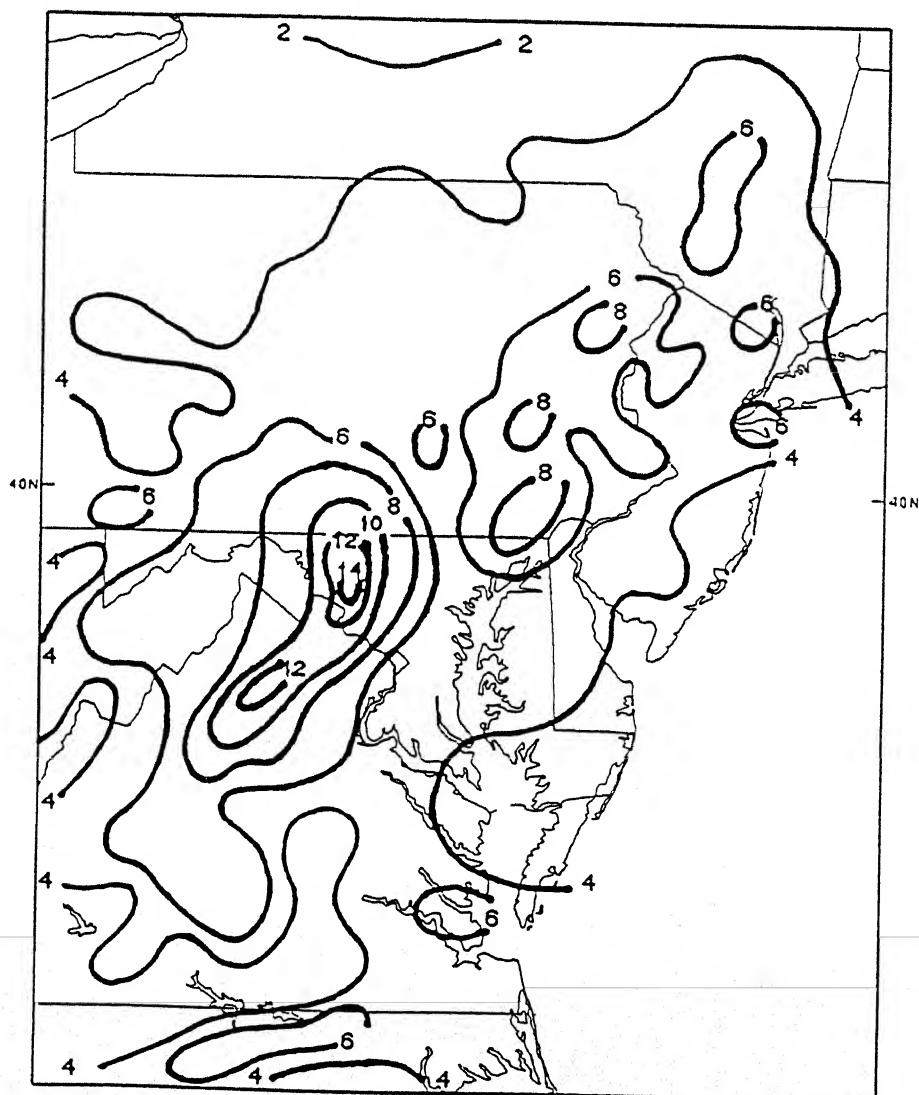


Figure 7. Monthly total precipitation (inches) in the mid-Atlantic region according to the River Forecast Center data. Up to 14.2 inches fell in central Maryland.

TABLE 3. MAY AVERAGE TEMPERATURES 5.0°F OR MORE ABOVE NORMAL.

Station	Degrees F		Station	Degrees F	
	Mean	Dep		Mean	Dep
Alexandria, MN	64.6	+9.2	Hancock, MI	55.6	+6.1
Fargo, ND	63.9	+8.3	Bismarck, ND	61.0	+6.1
Jamestown, ND	62.6	+8.3	Sioux City, IA	67.5	+6.0
St. Cloud, MN	63.7	+7.9	Waterloo, IA	65.1	+5.9
Spencer, IA	66.6	+7.9	Duluth, MN	55.9	+5.9
Watertown, SD	63.3	+7.9	Champaign/Urbana, IL	67.8	+5.9
Devil's Lake, ND	60.1	+7.7	Park Falls, WI	59.2	+5.8
Glasgow, MT	62.6	+7.7	Minot, ND	60.3	+5.8
Nome, AK	43.2	+7.4	Mason City, IA	64.2	+5.8
International Falls, MN	58.5	+7.2	Des Moines, IA	67.5	+5.6
Minneapolis, MN	65.5	+7.2	Norfolk, NE	66.2	+5.6
Sioux Falls, SD	65.1	+7.0	La Crosse, WI	64.8	+5.6
Aberdeen, SD	63.5	+7.0	Lincoln, NE	67.6	+5.4
Grand Forks, ND	61.3	+7.0	Burlington, IA	66.9	+5.4
Williston, ND	61.5	+6.8	Wausau, WI	60.6	+5.2
Bemidji, MN	58.6	+6.3	Warroad, MN	56.7	+5.0
Huron, SD	63.5	+6.3	Havre, MT	59.9	+5.0
Eau Claire, WI	63.3	+6.3	McGrath, AK	49.6	+5.0
Dickinson, ND	59.5	+6.3	Ottumwa, IA	67.5	+5.0

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)  
MAY 1988

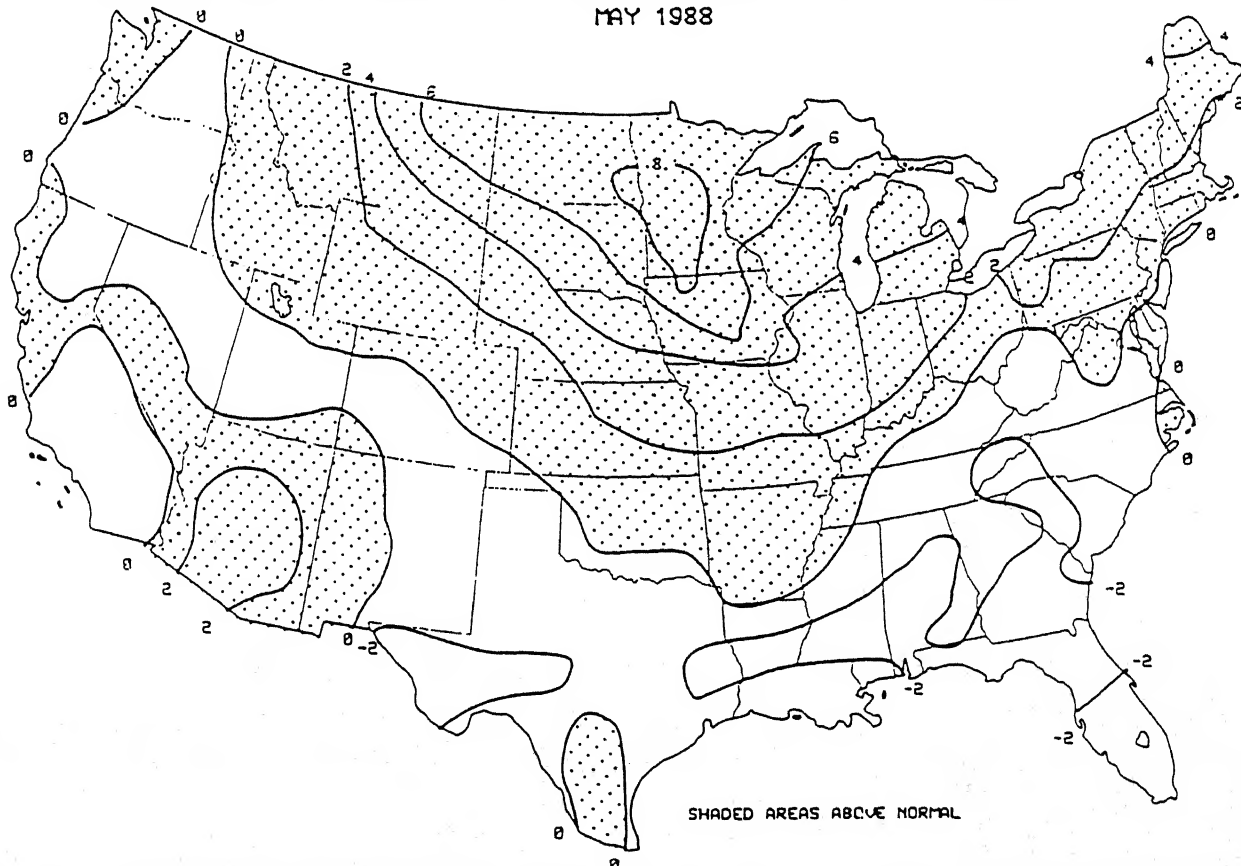


Figure 8. Departure from normal average temperatures (in degrees Fahrenheit) during May, 1988. Unseasonably warm weather covered the northern Great Plains and upper Midwest.

TABLE 4. MAY AVERAGE TEMPERATURES 2.0°F OR MORE BELOW NORMAL.

Station	Degrees F		Station	Degrees F	
	Mean	Dep		Mean	Dep
Gainesville, FL	71.6	-4.0	Knoxville, TN	64.9	-2.5
Jacksonville, FL	71.4	-3.8	Daytona Beach, FL	72.5	-2.5
Tallahassee, FL	70.3	-3.6	Apalachicola, FL	72.1	-2.3
Warner-Robins AFB, GA	70.3	-3.6	Asheville, NC	61.2	-2.3
Fayetteville, NC	66.6	-3.4	Yakima, WA	55.0	-2.3
Redding, CA	63.5	-3.4	Wenatchee, WA	57.9	-2.3
Lufkin, TX	71.1	-3.2	Ukiah, CA	59.5	-2.3
Meridian, MS	68.7	-3.1	Bakersfield, CA	68.4	-2.2
England AFB, LA	71.4	-3.1	Bristol, TN	62.2	-2.2
Anniston, AL	66.9	-3.1	Montgomery, AL	70.2	-2.2
San Angelo, TX	70.7	-3.1	Junction, TX	71.4	-2.2
Brunswick, GA	71.2	-2.9	Mt. Shasta, CA	51.1	-2.2
Macon, GA	69.8	-2.9	Stockton, CA	64.0	-2.0
Sumter/Shaw AFB, SC	68.7	-2.9	Wilmington, NC	68.7	-2.0
Key West, FL	77.9	-2.7	Tampa, FL	75.2	-2.0
Sexton Summit, OR	46.4	-2.7	Elkhart, KS	62.8	-2.0
Dalhart, TX	61.0	-2.5			

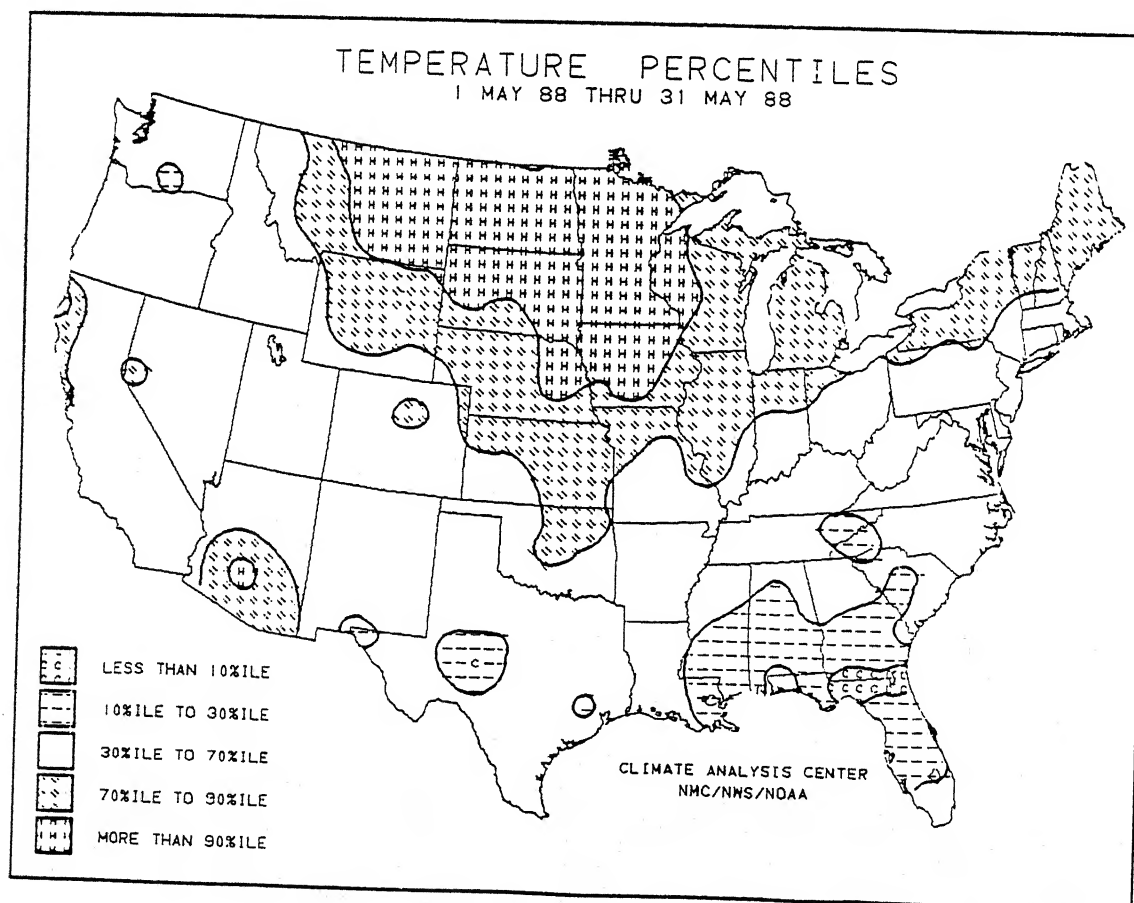


Figure 9. Average temperature percentiles for May, 1988. Statistically, many stations in the northern Great Plains had one of their warmest Mays, while parts of Florida observed one of their coolest Mays.

TABLE 5. RECORD MAY TOTAL PRECIPITATION.

<u>Station</u>	<u>Total</u> <u>(In.)</u>	<u>Normal</u> <u>(In.)</u>	<u>Pct of</u> <u>Normal</u>	<u>Record</u> <u>Type</u>
Washington/Dulles, VA	10.29	3.67	280.4	HIGHEST
Roswell, NM	3.42	0.71	481.7	HIGHEST
Chicago/O'Hare, IL	1.19	3.13	38.0	LOWEST
Rockford, IL	1.18	3.74	34.5	LOWEST
Tulsa, OK	1.17	5.12	22.9	LOWEST
Birmingham, AL	1.15	4.51	39.5	LOWEST
Indianapolis, IN	1.06	3.64	29.1	LOWEST
Waco, TX	0.65	4.70	13.8	LOWEST
Lansing, MI	0.63	2.35	26.8	LOWEST
Milwaukee, WI	0.50	2.64	18.9	LOWEST
Muskegon, MI	0.43	2.52	17.1	LOWEST
Shreveport, LA	0.42	4.71	8.9	LOWEST
Athens, GA	0.41	4.76	8.6	LOWEST
Houghton Lake, MI	0.38	2.59	14.7	LOWEST
Flint, MI	0.30	2.76	10.9	LOWEST
Green Bay, WI	0.06	3.11	1.9	LOWEST
Havre, MT	0 (1)	1.70	0	LOWEST
Phoenix, AZ	0 (1,2)	0.14	0	LOWEST
Yuma, AZ	0 (1,2)	0.03	0	LOWEST
Las Vegas, NV	0 (1,2)	0.19	0	LOWEST
Los Angeles, CA	0 (1,2)	0.13	0	LOWEST

Note (1): Zero totals may or may not contain "trace" amounts.  
 Note (2): Normally arid in the late spring and summer months.

TABLE 6. RECORD MAY AVERAGE TEMPERATURES.

	<u>°F)</u>	<u>Nml AvgT</u>	<u>Dep Nml AvgT</u>	<u>Type</u>
Sioux City, IA	67.5	61.5	+6.0	HIGHEST
Glasgow, MT	62.6	54.9	+7.7	HIGHEST
Jacksonville, FL	71.4	75.2	-3.8	LOWEST
Tampa, FL	75.2	77.2	-2.0	LOWEST

TABLE 7. RECORD MAY EXTREME TEMPERATURES.

<u>Station</u>	<u>Extreme</u> <u>(Degree F)</u>	<u>Record</u> <u>Type</u>
Glasgow, MT	102	HIGHEST
Miles City, MT	100	HIGHEST
Fort Wayne, IN	94	HIGHEST
La Crosse, WI	94	HIGHEST
Indianapolis, IN	93	HIGHEST
Detroit, MI	93	HIGHEST
Flint, MI	93	HIGHEST
Lincoln, NE	93	HIGHEST
Rockford, IL	92	HIGHEST
St. Louis, MO	92	HIGHEST
Helena, MT	91	HIGHEST
Cape Hatteras, NC	91	HIGHEST
Houghton Lake, MI	90	HIGHEST
Key West, FL	65	LOWEST
Bakersfield, CA	37	LOWEST

EXPLANATION OF CLIMATE ANOMALY DEPICTION CHARTS  
Climate Analysis Center, National Weather Service, NOAA

A. Four-Week Precipitation Anomalies:

The shaded areas depict regions where precipitation amounts for the four weeks ending on the indicated date are such that, when compared with the historical climatic record, they fall either within approximately the lowest ten percent or the highest ten percent of the smoothed historical distribution of precipitation amounts for the same calendar time period. One exception is made to this general procedure: In areas where the normal (mean) amount of precipitation for the four-week calendar period is less than 20 mm, anomalies are not depicted unless the currently reported amount of precipitation exceeds 50 mm. This exception prevents normally arid or seasonally dry regions from being depicted as anomalously dry on the chart; it also prevents wet anomalies from being depicted in such regions unless the amount of precipitation received is truly substantial.

A four week period is used for the determination of these depicted "short-term" anomalies because that is about the minimum length of time that a marked dry anomaly must exist in order for it to have a significant socio-economic impact. (Other charts are prepared that show three, six, and twelve-month "long-term" precipitation anomalies in a similar manner.)

The anomalies shown on the chart are based on approximately 2500 observing stations for which precipitation reports are sufficiently complete for the period. A small number of observations are allowed to be missing or are estimated conservatively based on partial reports. Because of this, a dry bias may exist for some stations used in the analysis. As a result, the extent of dry anomalies may sometimes be overestimated and wet ones underestimated. Additionally, there are insufficient reports from some regions for determining the magnitudes of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. No attempt is made to depict anomalies in such regions.

The chart shows general areas of four-week precipitation anomalies. Caution must be used in relating depicted anomalies to local conditions, especially in mountainous regions.

B. Two-Week Temperature Anomalies:

The shaded areas depict regions where the mean temperature for the two-week period ending on the indicated date departed from the normal mean temperature for the period by enough to place the departure in either the warmest 10 percent or coldest 10 percent of occurrences as determined from the smoothed climatological distribution. A two-week period is used because this period is short enough to capture major temperature excursions associated with movements of the major planetary waves of the general circulation, yet long enough to avoid the undue influence of temperature changes associated with relatively minor traveling disturbances. (Charts showing temperature anomalies for longer time periods are also prepared.) Temperature anomalies are never depicted if the departure of the temperature from normal is less than 1.5 C, since smaller departures are sensitive to data errors and are usually of small economic importance. A small number of temperature observations at a station are allowed to be missing or are estimated. These may result in either warm or cold bias at some locations. In other respects, the discussion of precipitation anomalies applies equally to temperature anomalies.

